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**(54) DIGITAL CAMERA, DOCUMENT PROCESSING SYSTEM USING THE SAME, COMPUTER READABLE STORAGE MEDIUM AND PROGRAM CODE TRANSMITTER**

(57) Abstract:

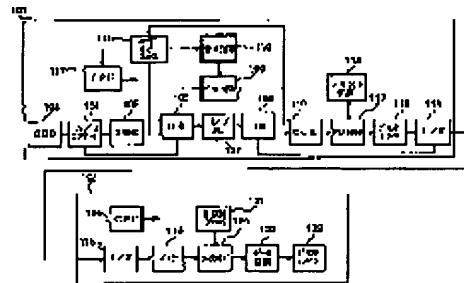
**PROBLEM TO BE SOLVED:** To provide a digital camera that can perform accurate document read and a document processing system using the digital camera.

**SOLUTION:** This system splits and photographs an original document by using a CCD103, a perspective correction (109) is applied to picture data for every split picture obtained by the split photographing, OCR processing is applied to the corrected picture data and the corrected picture data are converted into text data.

(71) Applicant: **CANON INC**(72) Inventor: **HONMA HIDEO**

Then, the text data corresponding to the picture data for every converted split picture are edited, integrated into one text data and the integrated text data are printing outputted.

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## CLAIMS

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### [Claim(s)]

[Claim 1] The digital camera characterized by having a photography means to photo a photographic subject, and a conversion means to perform OCR processing to the image data obtained by photoing said photographic subject with said photography means, and to change said image data into text data.

[Claim 2] Said photographic subject is a digital camera according to claim 1 characterized by including the document recorded on the record medium.

[Claim 3] Said photography means is a digital camera according to claim 1 characterized by including CCD.

[Claim 4] The digital camera according to claim 1 characterized by having further an output means to output said text data outside.

[Claim 5] The digital camera characterized by having a photography means to photo a photographic subject, and an amendment means to amend the image data obtained by photoing said photographic subject using said photography means.

[Claim 6] Said amendment means is a digital camera according to claim 5 characterized by including a display means to display an image based on said image data for said amendment, and a directions means to perform directions of said amendment.

[Claim 7] The amendment by said amendment means is a digital camera according to claim 5 characterized by being the Perth amendment.

[Claim 8] Said photographic subject is a digital camera according to claim 5 characterized by including the document recorded on the record medium.

[Claim 9] Said photography means is a digital camera according to claim 5 characterized by including CCD.

[Claim 10] The digital camera according to claim 5 characterized by having further an output means to output said image data outside.

[Claim 11] The digital camera characterized by having the means for switching which switches a photography means to photo a photographic subject, the 1st mode which acquires the image data obtained by photoing said photographic subject using said photography means as binary monochrome data, and the 2nd mode which acquires said image data as multiple-value color data.

[Claim 12] Said photographic subject is a digital camera according to claim 11 characterized by including the document recorded on the record medium.

[Claim 13] Said photography means is a digital camera according to claim 11 characterized by including CCD.

[Claim 14] The digital camera according to claim 11 characterized by having further an output means to output said image data outside.

[Claim 15] The digital camera according to claim 11 characterized by having further an amendment means to amend the image data obtained by photoing said photographic subject using said photography means.

[Claim 16] The amendment by said amendment means is a digital camera according to claim 15 characterized by being the Perth amendment.

[Claim 17] The digital camera according to claim 15 characterized by performing OCR processing to the image data amended by said amendment means, and having further a conversion means to change said image data into text data.

[Claim 18] An amendment means to amend the image data corresponding to two or more images of each obtained by dividing and photoing said photographic subject to two or more fields using a photography means to photo a photographic subject, and said photography means, A conversion means to perform OCR processing to said amended image data, and to change said amended image data into text data, The digital camera characterized by having an integrated means to edit the text data corresponding to the image data for said every division image changed by said conversion means, and to unify to one text data.

[Claim 19] Said photographic subject is a digital camera according to claim 18 characterized by including the document recorded on the record medium.

[Claim 20] Said photography means is a digital camera according to claim 18 characterized by including CCD.

[Claim 21] The digital camera according to claim 18 characterized by having further a 1st directions means to direct to change photography mode according to the class of said photographic subject, a 2nd directions means to direct to choose one division pattern as said photography means from two or more predetermined division patterns, and a 3rd directions means to carry out amendment directions to said amendment means.

[Claim 22] The digital camera according to claim 21 characterized by having the 1st mode which photos said photographic subject as a binary image of monochrome, and the 2nd mode which photos said photographic subject as a multiple-value image of a color in said photography mode.

[Claim 23] The digital camera according to claim 18 characterized by having further an interface means to output the text data integrated by said integrated means to an external device.

[Claim 24] The digital camera according to claim 23 characterized by having further a display means to display the image photoed by said photography means.

[Claim 25] Said amendment means is a digital camera according to claim 24 characterized by amending distortion of said photoed image at MAMMASHININTARAKUTIBU in the clockwise rotation and the direction of a counterclockwise rotation centering on a core of a horizontal direction, a perpendicular direction, and said display image, referring to the image displayed on said display means according to directions by said 3rd directions means.

[Claim 26] Said integrated means is a digital camera according to claim 18 characterized by to be based on the image data for said two or more images of every obtained by said conversion means, and to include a detection means to detect the part to which said two or more images of each adjoin or overlap mutually, and the coupling means which combines the text data corresponding to the image data for said two or more images of every based on the detection result by said detection means.

[Claim 27] The digital camera according to claim 18 characterized by having further a 1st storage means to store the image data for said two or more images of every obtained by photography by said photography means, and a 2nd storage means to store the text data integrated by the text data changed by said conversion means, and said integrated means.

[Claim 28] The digital camera according to claim 27 characterized by having further a compression means to compress before storing in said 1st storage means the image data for said two or more images of every obtained by photography by said photography means, and an expanding means to read the image data which was compressed by said compression means and stored in said 1st storage means, and to elongate.

[Claim 29] The document processing system system characterized by having a receiving means to be claim 18 thru/or a document processing system system using the digital camera of any one publication of 28, and to receive the text data integrated by said integrated means, and the output means which carries out the printed output of the text based on the text data received by said receiving means.

[Claim 30] Said output means is a document processing system system according to claim 29 characterized by being a printer.

[Claim 31] The document-processing-system system characterized by to have an input means input two or more images, a character-recognition means perform character-recognition processing to two or more of said images of each inputted by said input means, an integrated means unify the text data obtained by performing character-recognition processing to two or more of said images of each by said character-recognition means in one document, and an output means output the document obtained by said integrated means.

[Claim 32] Said digital camera is a document processing system system according to claim 31 characterized by including an exchange means to support so that the image drawn on the 1-page record medium may be divided into two or more fields and it may input as two or more images for every field including the digital camera with which said input means carried CCD.

[Claim 33] Said input means is a document processing system system according to claim 32 characterized by including an amendment means to amend distortion of the inputted image.

[Claim 34] Said integrated means is a document-processing-system system according to claim 31 characterized by to be based on the image data for said two or more images of every obtained by said character recognition means, and to include a detection means to detect the part to which said two or more images of each adjoin or overlap mutually, and the coupling means which combines the text data corresponding to the image data for said two or more images of every based on the detection result by said detection means.

[Claim 35] Said output means is a document processing system system according to claim 31 characterized by being a printer.

[Claim 36] The program code which performs input process which is the computer-readable storage which memorized the program code which performs an image processing, and inputs two or more images, The program code which performs character recognition processing to said two or more images of each inputted by said input process, The program code which performs integrated processing which unifies the text data obtained by performing character recognition processing to said two or more images of each in one document, The computer-readable storage characterized by having the program code which performs output processing which outputs the document obtained by said integrated processing.

[Claim 37] The program code which performs input process which inputs two or more images, and the program code which performs character recognition processing to said two or more images of each inputted by said input process, The program code which performs integrated processing which unifies the text data obtained by performing character recognition processing to said two or more images of each in one document, Program code sending-out equipment characterized by sending out a series of program codes which have the program code which performs output processing which outputs the document obtained by said integrated processing through a communication line.

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[Translation done.]

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**DETAILED DESCRIPTION****[Detailed Description of the Invention]**

[0001]

[Field of the Invention] Especially this invention relates to the digital camera which reads a manuscript document and performs OCR processing, the document processing system system using the digital camera, a computer-readable storage, and program code sending-out equipment about a digital camera, a document processing system system, a computer-readable storage, and program code sending-out equipment.

[0002]

[Description of the Prior Art] The document recorded on paper etc. is read, when it is going to change into text data and is going to hold, the document is first read as image data using OCR etc., and the image data is changed into text data. The printout of the text data is transmitted and carried out to a printer to reproduce the document. When the document is held as text data, there is a merit called improvement in reduction of data volume which memorizes the same document as compared with the case where it holds as image data, the ease of data handling, and the grace at the time of a printout.

[0003] Moreover, the flat-bed scanner, the sheet feed scanner, or the handy scanner has been conventionally used as a means for reading a document as image data.

[0004] However, since the small and cheap digital camera has recently spread, it is possible to use this as a reading means of a document. It is because this is enabled to acquire a document as image data easily except a desktop environment.

[0005]

[Problem(s) to be Solved by the Invention] However, when using it as a means of document reading of a digital camera, there are the following problems.

(1) When it is going to perform secured usual OCR processing of the information resolution which is required for OCR processing, it is called 200dpi with an English font, and it is said with Japanese fonts that the resolution of 300dpi extent is required. For example, if it is going to read the whole detail paper of A4 size by resolution 300dpi, it will become abbreviation 8 inch x 11 inch, then about 2400x3300 pixel about the size. In a digital camera with CCD of the about 1200x1000 number of pixels which has generally spread on the other hand, data required for OCR processing are not securable.

(2) Since distortion of an incorporation image and the Perth amendment take a photograph with a need camera and the photoed image which read like other reading means (a flat-bed scanner, sheet feed scanner, etc.), and carried out the right pair correctly to the object cannot necessarily be acquired, amendment processing is needed.

[0006] This invention was made in view of the above-mentioned conventional example, and aims at offering the document processing system system using the digital camera which can do exact document read, and its digital camera, a computer-readable storage, and program code sending-out equipment.

[0007]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the digital camera of this invention consists of the following configurations.

[0008] That is, it has the digital camera characterized by having a photography means to photo a photographic subject, and a conversion means to perform OCR processing to the image data obtained by photoing said photographic subject with said photography means, and to change said image data into text data.

[0009] Here, said photography means contains CCD including the document with which said photographic subject was recorded on the record medium.

[0010] Furthermore, it is desirable to have an output means to output text data outside.

[0011] Even when an alphabetic character image is photoed by having such a description, alphabetic character reading is

made easily.

[0012] Moreover, according to other invention, it has the digital camera characterized by having a photography means to photo a photographic subject, and an amendment means to amend the image data obtained by photoing said photographic subject using said photography means.

[0013] Here, as for said amendment means, it is desirable to have a display means to display an image based on the image data for amendment like the Perth amendment, and a directions means to perform directions of the amendment.

[0014] Moreover, said photography means contains CCD including the document with which said photographic subject was recorded on the record medium.

[0015] Furthermore, it is desirable to have an output means to output text data outside.

[0016] Even when an alphabetic character image is photoed by having such a description, distortion of the read alphabetic character image is amended.

[0017] It has the digital camera characterized by having the means for switching which switches the 1st mode which acquires the image data obtained by photoing said photographic subject using a photography means to photo a photographic subject, and said photography means according to invention of further others as binary monochrome data, and the 2nd mode which acquires said image data as multiple-value color data.

[0018] Here, said photography means contains CCD including the document with which said photographic subject was recorded on the record medium.

[0019] Furthermore, it is desirable to have an output means to output text data outside. It is desirable to have the amendment means which carries out amendment like the Perth amendment as opposed to the image data obtained by photoing said photographic subject using said photography means further again, to perform OCR processing to the amended image data, and to have a conversion means to change said image data into text data further again.

[0020] By having such a description, an alphabetic character image can be inputted in the optimal format for the following processing, and memory space required for storing of an input-statement stroke image can be reduced.

[0021] An amendment means to amend the image data corresponding to two or more images of each obtained by dividing and photoing said photographic subject to two or more fields using a photography means to photo a photographic subject, and said photography means further again according to other invention, A conversion means to perform OCR processing to said amended image data, and to change said amended image data into text data, It has the digital camera characterized by having an integrated means to edit the text data corresponding to the image data for said every division image changed by said conversion means, and to unify to one text data.

[0022] Here, as for said photographic subject, it is desirable to include the document recorded on the record medium.

[0023] Moreover, as for said photography means, it is desirable to include CCD.

[0024] Furthermore, the 1st mode which photos a photographic subject as a binary image of monochrome, corresponding to the class of said photographic subject, A 1st directions means to direct to change photography mode like the 2nd mode which photos a photographic subject as a multiple-value image of a color, It is good to have a 2nd directions means to direct to choose one division pattern as a photography means from two or more predetermined division patterns, and a 3rd directions means to carry out amendment directions to an amendment means. It is good to have an interface means to output the text data integrated by the integrated means to an external device further again. It is good to have a display means to display the image photoed by the photography means further again.

[0025] And it is good for MAMMASHININTARAKUTIBU to amend distortion of the image photoed in the clockwise rotation and the direction of a counterclockwise rotation centering on a core of a horizontal direction, a perpendicular direction, and its display image, said amendment means referring to the image displayed on the display means according to directions by the 3rd directions means.

[0026] On the other hand, as for said integrated means, it is desirable for it to be based on the image data for two or more images of every obtained by the conversion means, to detect the part to which two or more images of each adjoin or overlap mutually, and to combine the text data corresponding to the image data for two or more images of every based on the detection result.

[0027] Furthermore, a 1st storage means to store the image data for two or more images of every obtained by the division photography by said photography means, It is desirable to have a 2nd storage means to store the text data integrated by the text data changed by said conversion means and said integrated means. Furthermore, it is still more desirable when it has a compression means to compress before storing in the 1st storage means the image data for two or more images of every obtained by photography by said photography means, and an expanding means to read the image data which was compressed and was stored in the 1st storage means, and to elongate.

[0028] According to other invention, it is a document processing system system using the digital camera of the above-mentioned configuration, and has the document processing system system characterized by having a receiving means to

receive the text data integrated by said integrated means, and the output means which carries out the printed output of the text based on the text data received by said receiving means further again.

[0029] Here, the output means is good in it being a printer.

[0030] A photographic subject is divided and photoed by having such a description, the image data for two or more images of every obtained by the photography is amended, and OCR processing is performed to the amended image data, and the amended image data is changed into text data, and it operates so that the text data corresponding to the changed image data for two or more images of every may be edited and it may unify to one text data.

[0031] Moreover, the printed output of the text data integrated is carried out.

[0032] An input means to input two or more images according to other invention further again, and a character recognition means to perform character recognition processing to said two or more images of each inputted by said input means, It has the document processing system system characterized by having an integrated means to unify the text data obtained by performing character recognition processing to said two or more images of each by said character recognition means in one document, and an output means to output the document obtained by said integrated means.

[0033] The program code which performs input process which is the computer-readable storage which memorized the program code which performs an image processing, and inputs two or more images further again according to other invention, The program code which performs character recognition processing to said two or more images of each inputted by said input process, The program code which performs integrated processing which unifies the text data obtained by performing character recognition processing to said two or more images of each in one document, It has the computer-readable storage characterized by having the program code which performs output processing which outputs the document obtained by said integrated processing.

[0034] The program code which performs input process which inputs two or more images further again according to other invention, The program code which performs character recognition processing to said two or more images of each inputted by said input process, The program code which performs integrated processing which unifies the text data obtained by performing character recognition processing to said two or more images of each in one document, It has program code sending-out equipment characterized by sending out a series of program codes which have the program code which performs output processing which outputs the document obtained by said integrated processing through a communication line.

[0035] Since a program equipped with the description explained above by using such equipment can be electronically offered through means of communications, such as the Internet, the value brought about also by this invention can be enjoyed quickly easy again.

[0036]

[Embodiment of the Invention] With reference to an accompanying drawing, the gestalt of suitable operation of this invention is explained to a detail below.

[0037] Drawing 1 is the block diagram showing the configuration of the document scan system (henceforth a system) which consists of a digital camera which is the typical operation gestalt of this invention, and a printer. In drawing 1, a system consists of a digital camera 101 and a printer 102, links the output of a digital camera 101 with a printer 102 directly, and can print it now.

[0038] First, the configuration of a digital camera 101 is explained.

[0039] A document is photoed by CCD103 and CCD103 outputs the analog signal acquired from the photoed document image to A/D converter 104. The photography picture signal digitized by A/D converter 104 is made binary in the binary-sized processing section 105, and a compression zone 106 compresses it further, and it is stored in image memory 107.

[0040] After being restored in the expanding section 108 and carrying out Perth amendment in the Perth amendment section 109, the binary-sized image data once stored in image memory 107 is again compressed by the compression zone 106, and is again stored in image memory 107. The Perth amendment section 109 performs Perth amendment according to directions of the amendment directions section 110 holding the contents of amendment which the user directed through the user interface 111. Here, a user interface contains the switch which a user operates, and the viewer which displays a photography image. In addition, the processing detail of the Perth amendment is explained to a detail later.

[0041] Perth amendment is carried out, and it is again elongated in the expanding section 108, and store \*\*\*\* image data is changed into text data in the OCR processing section 112, and is stored in the text memory 113 by image memory 107. The text synthesis section 114 performs synthetic processing of the contents of the text memory 113. This is processing which connects the text by which division photography was carried out in two or more images, compounds the whole document (page), and is again stored in the text memory 113.

[0042] When carrying out the printed output of the text data stored in text memory, the compounded text data is

incorporated by the printer driver 115 into printer control data flow, and is outputted to a printer 102 from the interface (I/F) 116 by the side of a digital camera.

[0043] In addition, CPU117 supervises activation of each part of a digital camera, and it carries out it to control so that the above-mentioned processing may be performed. Moreover, when a digital camera performs not photography of a document but the usual photography, such as scenery and a person's photography, it is written in the image memory 107 compressed as it was, or neither binary-sized processing about the image data nor OCR processing is performed, but the image data by which A/D conversion was carried out is read from image memory 107, and the elongated image data is outputted to an interface (I/F) 116 as it is. The change of these processings is directed by the change of the switch formed in the user interface 111, and CPU117 performs it.

[0044] On the other hand, an interface (I/F) 118 receives the text data transmitted from the digital camera 101, and the text data which received consists of printers 102 with a layout predetermined in the layout section 119. And a rasterizer 120 is developed to bit map data according to the font information (Font) 121 in which the receiving text data was stored by ROM121 (un-illustrating). The data-conversion section 122 changes the bit map data into the data format and data stream according to the specification of printer engine 123, and outputs it to printer engine 123. Based on this data stream, the printed output of the printer engine 123 is carried out to the last.

[0045] In addition, CPU124 supervises activation of each part of a printer, and it controls it so that the above-mentioned processing is performed.

[0046] Next, processing until the user of a digital camera photos the document put up for paper or a wall and does the printout of this from a printer using the system of the above configurations, and actuation of a digital camera and each part of a printer are explained to a detail.

[0047] Drawing 2 is a flow chart which shows document reading and OCR processing with a digital camera.

[0048] First, in step S201, the user of a digital camera 101 operates the switch of the user interface 111 of a camera, and sets the mode of a camera as document scan mode. In this mode, a camera sets photography mode for example, as monochrome mode, and it sets it up so that the output from A/D converter 104 may be made binary. In addition, in photoing scenery, a person, etc., the user of a digital camera 101 operates the switch of the user interface 111 of a camera, and sets the mode of a camera as natural drawing mode. In this mode, a camera carries out color photography of the photographic subject, and the data of each color component (RGB) of pixel each, obtained as a result, are expressed by 8 bits.

[0049] Next, in step S202, a digital camera 101 displays the division pattern of the whole document for the page 1 of a record form on viewers, such as LCD prepared in the user interface 111, and a user chooses a desired division pattern from the switch formed in the user interface 111.

[0050] Drawing 3 is drawing showing the example of the division pattern displayed by the viewer. In these drawings, the case where drawing 3 (a) quadrisects 1 page of the whole, and drawing 3 (b) quadrisects 1 page of the whole comparatively for 8 minutes is expressed. As shown in drawing 3, these division calls a tile each block which divided from dividing 1 page of the whole in the shape of a tile. Moreover, the number given to each tile shows the order of photography. The digital camera 101 prepares some kinds of such patterns beforehand, and a tile division pattern is determined by actuation of a user interface 111.

[0051] Furthermore in step S203, the user of a digital camera 101 photos processing in the order as which only the selected division number of sheets was displayed. At this time, for the text synthesis processing mentioned later, a photograph is taken so that the contents of each tile may overlap. Moreover, the number displayed on the division pattern shown in drawing 3 is displayed on the interior of PYUWA, and you may enable it to check which tile the user is photoing.

[0052] Next, if a digital camera 101 checks completion of photography of each tile, processing will start the Perth amendment actuation in step S204. The check of this completion displays a check prompt on a viewer for example, after division number-of-sheets photography, and when a user inputs directions of "O.K." from a switch, it is performed. The Perth amendment displays each photography image on a viewer, and a user performs it by directing amendment.

[0053] Drawing 4 is drawing showing the example of the contents of directions in the Perth amendment. In these drawings, in drawing 4 (a), the whole inclination amendment (rotation) and drawing 4 (b) show horizontal keystone correction, and drawing 4 (c) shows vertical keystone correction.

[0054] A digital camera 101 displays in piles a square amendment gage like the dotted line shown at drawing 4 on the image on a viewer screen. As shown in drawing 4 (a), four top-most vertices of the amendment gage are set to "A", "B", "C", and "D." A user rotates the amendment gage by button grabbing prepared in the user interface 11, or makes it deform. Directions of spin compensation rotate the gage to a clockwise rotation or a counterclockwise rotation by setting a revolving shaft as the core of an amendment gage, as shown in drawing 4 (a). Moreover, if the amendment gage of

\*\*\*\*\* deforms into a trapezoid with parallel surface and lower side from the first as it is shown in drawing 4 (b), when horizontal amendment is directed, and perpendicular direction amendment is directed, as shown in drawing 4 (c), the amendment gage of \*\*\*\*\* will deform left part and the right-hand side into an parallel trapezoid from the first. Thus, deformation of rotation, a horizontal direction, a perpendicular direction, and an amendment gage is directed, and finally, if a user inputs directions of "O.K." from a switch, a digital camera will amend Perth of the whole image so that the displayed amendment gage may serve as a rectangle.

[0055] This Perth amendment elongates once the data of the photography image held at image memory 107 in the expanding section 108, and the Perth amendment section 109 with work-piece memory is performed according to the contents of directions from the amendment directions section 110. Then, the image data which amended is repressed by the compression zone 106, and is again stored in image memory 107. Such a series of procedures are controlled by CPU117, and the Perth amendment processing to all photography images is performed.

[0056] Here, the detail of the Perth amendment is explained with reference to drawing 5 - drawing 6.

[0057] Drawing 5 is the block diagram showing the internal configuration of the Perth amendment section 109. The coordinate-transformation section which performs coordinate transformation to the buffer which 109a inputs the data elongated in the expanding section 108 in drawing 5, and is held temporarily, and the data with which 109b was held at buffer 109a, the interpolation processing section to which 109c performs interpolation processing further about the data with which coordinate transformation was performed, and 109 d are the buffers which store temporarily the data with which coordinate transformation and interpolation processing were performed.

[0058] And the data stored in buffer 109d are fed back to a compression zone 106.

[0059] Drawing 6 is a flow chart which shows the processing detail of the Perth amendment. If it is called the Perth amendment according to the configuration shown in drawing 5, it will be generating the pixel data stream which loads the image data elongated in the expanding section 108 to buffer 109a, performs coordinate transformation and interpolation processing to the pixel data which constitute each tile according to the rotation directions by the user, or the deformation directions to level/perpendicular direction in this, and constitutes the tile after rotation or deformation to buffer 109d.

[0060] Hereafter, the processing detail is explained. Here, it is premised on image data already being loaded to buffer 109a. Moreover, the location of the pixel of the arbitration which constitutes the image data before Perth amendment is performed is expressed with (X, Y), and the location which is the pixel after Perth amendment was performed presupposes that it is expressed with (x, y).

[0061] First, at step S211, each coordinate value of the image data (for example, side A'D' and side B'C' of drawing 4 A) after rotation or/, and deformation were made according to rotation directions or/, and deformation directions is calculated in the tile with which directions of the Perth amendment were made about each coordinate value of the image data for two rasters including the top-most vertices of a tile which counter (for example, the side AD and the side (BC) of drawing 4 A).

[0062] Next, at step S212, the obtained coordinate value is compared with the coordinate value before coordinate transformation, and the shift amount per each pixel of a tile is calculated.

[0063] For example, in the case of drawing 4 A - drawing 4 C, the pixel of "Y0" individual is perpendicularly between the side AD and the side BC about input image data, and if the side AD and the side BC have the pixel of "X0" individual horizontally, respectively, they are as follows, respectively. [ of the horizontal and the shift amount (Xshift, Yshift) about a perpendicular direction of each pixel which constitute a tile ]

The coordinate value after coordinate transformation is calculated by carrying out sequential accumulation of this shift amount perpendicularly with each pixel as the starting point which constitutes the side AD about each pixel in a tile at step S213 in  $Xshift = (x-X)/X0$   $Yshift = (y-Y)/Y0$  pan based on the obtained shift amount.

[0064] For example, the i-th is as follows, and when were based on this shift amount and the A point of the tile before conversion is made into a zero, the j-th coordinate value ( $x_i, y_j$ ) is as follows perpendicularly horizontally.

$x_i = i + Xshift - (i-1)$

$y_j = j + Yshift - (j-1)$

At step S214, the image data by which coordinate transformation was carried out by doing in this way is stored in buffer 109d. Processing of steps S211-S214 explained above is performed in coordinate transformation section 109b.

[0065] Next, it investigates whether in step S215, processing is vacant in the tile after rotation and/, or deformation, and has a pixel.

[0066] For example, if an image is extended horizontally in drawing 4 B, many pixels will be contained in the tile after deformation from the tile before deformation, and many empty pixels to which image data does not correspond to the tile after deformation only by performing coordinate transformation will arise.

[0067] Since in drawing 4 B the side AD was not extended but the side BC is extended, as for "X0" \*\*\*\*\* , then its dilation ratio (alpha), a pixel is set to alpha=X0' / X0 at side B'C'.

[0068] Therefore, the pixel of an individual (X0'-X0) is in an opening on side B'C' , and it is in the raster line of the j-th line from the side AD (X0/Y0). -(alpha-1)- An empty pixel without data generates j pixels.

[0069] in addition, the result obtained in coordinate count of a pixel in the above explanation -- an integer -- it cannot be overemphasized that are-izing and it is used.

[0070] When it is judged that there is an empty pixel in step S215 from the above reason, processing progresses to step S216, makes the empty pixel an attention pixel, and interpolates and calculates the value of the attention pixel using the pixel in which surrounding data exist. The interpolated data is written in buffer 109d. Then, processing progresses to step S217.

[0071] On the other hand, when it is judged that there is no empty pixel, it investigates whether processing progressed to step S217 and the processing about the pixel for 1 raster line ended it. Here, if it is judged that the processing about the pixel for 1 raster line is not completed, processing will return to step S213, but if it is judged that the processing was completed, processing will progress to step S218.

[0072] At step S218, it investigates whether the processing about the image data for one tile was completed. Here, if it is judged that the processing about all the pixels for one tile is not completed, processing will return to step S213, but processing will be ended if it is judged that the processing was completed.

[0073] Such Perth processing is performed about each tile.

[0074] Then, processing changes the contents of photography of each tile into text data in the OCR processing section 112 in step S205. Furthermore, the OCR processing section 112 processes into the data of the two-dimensional array structure corresponding to the line of a text the text data obtained from each tile, and stores this in the text memory 113.

[0075] At step S206, the text synthesis section 114 compounds the text data for every tile, and generates the whole document data. As this is the following, it is performed.

[0076] That is, since the contents of each tile overlap and are read at the time of photography of a document as mentioned above, by comparing the periphery of the text data of each tile of two-dimensional array structure, the same character is found out, and a duplicate character deletes one of these, and it connects and unites the text data of each tile so that a continuous text may be done.

[0077] For example, when a text connects the tile 1 and tile 2 of drawing 3 B by lateral writing, the same data stream (lengthwise direction) as the left end section of the text data of a tile 2 searchs whether it exists in the text data of a tile 1, and detects the part which overlaps. And the part which overlaps is deleted from a tile 1 or a tile 2, and after that, the text data of two tiles is compounded and it unifies to new DS. This is similarly performed about tiles 3 and 4.

[0078] Next, the tile with which tiles 1 and 2 were combined, and the tile with which 3 and 4 were combined are joined in the direction of a line (width). This detects the line of both same contents and unifies it to still newer DS the same with being related with a lengthwise direction. Even when overlap between tiles is not detected by these processings, these tiles have touched spatially, or since it can be regarded as close data, they unify DS, assuming that it has touched here. Or since that is specified when overlap is not detected, tooth-space insertion may be carried out and a tile may be combined.

[0079] Thus, the document for 1 page finally read is unified to one DS, and the DS integrated is re-stored in the text memory 113.

[0080] Next, a printed output is explained with reference to the flow chart shown in drawing 5 .

[0081] First, a user takes out print directions with step S301 through a user interface 111. Next, a printer driver 115 publishes a command required for print directions, and controls a printer by step S302 while it transmits the text data which was stored in the text memory 113 and which is integrated to a printer 102 through an interface (I/F) 116. In addition, in print directions, while specifying the interface of a digital camera and a printer so that a print layout may be possible, a digital camera 101 may be equipped with the function which can perform layout directions from a user interface 111. On the other hand, a printer 102 receives text data through an interface (I/F) 118, and performs layout processing according to a form setup etc. in the layout section 119.

[0082] Furthermore, at step S303, a rasterizer 120 rasterizes the text data arranged using the predetermined font stored in ROM121, and the data-conversion section 122 changes the data rasterized and bit-map-ized into the data stream which suits printer engine 123 in step S304 in order of conversion, i.e., the format for which printer engine 123 needs, and data delivery.

[0083] Finally, at step S305, according to the print timing of printer engine 123, the changed data stream is transmitted to printer engine 123, and a printed output is carried out to real time.

[0084] Therefore, if the operation gestalt explained above is followed, the document recorded on the page 1 of a record

form will be divided and read. Since the image data which carried out division read is changed into text data, it unifies to the text data which edits, connects and unites the changed text data, and is equivalent to the page 1 of a record form and the printed output of the unified text data is carried out Even if the read resolution of a digital camera is low and resolution sufficient in reading which is 1 time to perform OCR processing is not obtained By dividing and reading a document, resolution required for OCR processing is secured, after that, edit integration of the text data obtained by OCR processing can be carried out automatically, and the text data for 1 page can be created.

[0085] This can perform read of a document, and OCR processing easily using a digital camera also except a desktop environment.

[0086] Furthermore, since it has data storage memory in the digital camera itself, there is also an advantage that the immediate printing output also of the \*\* can be carried out without a host etc.

[0087] In addition, the example explained above explained as an example the Perth amendment, OCR, and the digital camera that contained the function of text synthesis. However, this invention is not limited by this.

[0088] For example, if it is the digital camera equipped with CCD of high resolution, tile division etc. does not have the need and, so, the function of text synthesis is unnecessary. Moreover, if the graphic size drawn on the image manuscript is large enough, even if it is the digital camera equipped with CCD of a low resolution, tile division etc. does not have the need, and, so, the function of text synthesis is unnecessary. Furthermore, since it becomes without distorting the image to picturize when a digital camera can be fixed to a tripod or a stand and it can be made to meet correctly to an image manuscript, the function of the Perth amendment becomes unnecessary.

[0089] Therefore, like digital camera 101a shown in drawing 8 as a minimum configuration of the digital camera in this operation gestalt, if it is the configuration equipped with the OCR processing section 112, document read and OCR processing can be performed. Since the configuration of the digital camera is simplified by this and some memory and circuits can be omitted by it, there is an advantage of becoming cheap.

[0090]

[Other operation gestalten] now -- although the above-mentioned operation gestalt explained the example which constituted the system from a digital camera and a printer, since an advanced intelligence function is required of a digital camera with this configuration -- a digital camera and the printer itself -- it will become expensive. Therefore, the example which is made to perform the Perth amendment and OCR processing with a personal computer, and constitutes a document scan system from this operation gestalt by the digital camera which can only read two or more images, the personal computer, and the printer is explained.

[0091] Drawing 8 is the block diagram showing the outline configuration of the document scan system according to this operation gestalt. in addition, in drawing 8, drawing 1 already explained -- the same reference number is given to the same component, and the explanation is omitted.

[0092] The document scan system shown in drawing 8 consists of digital camera 101', a personal computer 130, and a printer 102. The configuration of digital camera 101' is simplified compared with it which showed drawing 1, it is picturized by CCD103 and the image data by which compression storing was carried out is transmitted to a personal computer 140 through host interface 116' at image memory 107 so that the comparison with drawing 8 and drawing 1 may show.

[0093] Now, the personal computer 130 While controlling the whole equipment, various application programs (it is called application) are performed. When CPU131 performs CPU131 which performs various processings, ROM132 which stores a control program and various constants, a control program, and application It equips with RAM133 which is alike and is used as a working area, and CD-ROM142 which stored various programs and data. The hard disk drive (HDD) 136 and image which are used since CD-ROM drive 134 to read, the floppy disk drive (FDD) 135 which output and input information between floppy disks 143, and mass data are stored, a text, a graphic form -- etc. -- displaying -- CRT -- or -- LCD -- etc. -- a display (DPY) -- 137 -- a mouse -- a key -- containing -- a keyboard -- (- KB --) -- 138 -- etc. -- an element -- from -- being realized -- \*\*\*\* .

[0094] And such a component of each other is connected by the CPU bus 144.

[0095] further -- these elements -- in addition, it has various kinds of interfaces for connection with a network, or connection with a peripheral device. That is, it has the printer interface 141 used in order to transmit data to the digital camera interface 140 used in order to receive the network interface 139 and the image data from digital camera 101' which are used in order to download a program from remote-data sending-out equipment 150 by the Internet, LAN, etc. or to transmit and receive various data through a communication line, and a program 102 and to make a printed output perform.

[0096] Now, if the application which performs the Perth amendment which was explained with the above-mentioned operation gestalt by reading the download which minded [ of the above configurations / 130 ] the network from remote-

data sending-out equipment 150, CD-ROM142 or a floppy disk 143, etc., and OCR processing is installed, the Perth amendment and OCR processing can be performed in a personal computer 130.

[0097] Next, with reference to the flow chart shown in drawing 9, the Perth amendment and OCR processing which are performed in a personal computer 130 are explained. Here, install of application is already completed, digital camera 101' is connected to a personal computer 130, and two or more tiles which divided and picturized the 1-page image manuscript to two or more fields are transmitted and elongated by the personal computer 130 from digital camera 101', and suppose that it is stored in a predetermined storage (for example, hard disk 136).

[0098] Starting of the application which performs the Perth amendment and OCR processing by operating a keyboard and a mouse chooses first the image manuscript for 1 page used as the Perth amendment and the object which performs OCR processing (tile set) at step S401. This selection is performed to MAMMASHININTARAKUTIBU, while an operator looks at a display screen. At step S402, a tile set is loaded to the working area of RAM133 by this selection.

[0099] Next, at step S403, the tile which serves as a processing object from the loaded tile set is chosen as MAMMASHININTARAKUTIBU. Then, it is asked whether application performs the Perth amendment processing to an operator in step S404. Here, if that is answered when an operator judges that the amendment is performed, it will be further asked to an operator what kind of Perth amendment processing progresses to step S405 and carries out. Here, the directions which an operator performs are the same Perth amendment assignment as the above-mentioned operation gestalt explained. After the assignment is completed, processing performs processing of the same Perth amendment in step S406 as the above-mentioned operation gestalt explained. Amendment will be performed to the image data of the tile loaded to the working area of RAM133 by this.

[0100] Now, when it is judged that the Perth amendment processing is not performed, after completing processing to step S406, processing progresses to step S407 and performs OCR processing. Text data is generated from a tile by this. This text data is stored in a predetermined storage (for example, hard disk 136) in step S408.

[0101] Then, it judges whether processing processes the following tile in step S409. Here, if the processing about all the tiles that constitute the 1-page image manuscript used as a processing object has not been completed, processing will repeat return and the above-mentioned processing to step S403. On the other hand, if the processing about all tiles is completed, it will progress to step S410.

[0102] Edit generation of the text data which compounds the text data generated for every tile, and constitutes a 1-page image manuscript from a step S410 is carried out. Since processing of this edit and generation is the same processing as the above-mentioned operation gestalt explained, that explanation is omitted.

[0103] Therefore, if the operation gestalt explained above is followed, even when it does not have an advanced in RIJIENSU function in a digital camera, it will become possible by using the function of a personal computer to generate text data. Moreover, since the application performed in the personal computer can be downloaded and installed through a network from the equipment which it installed using storages, such as CD-ROM and a floppy disk, and also was formed in the remote place, it also has the advantage that the application can be offered more quickly.

[0104] In addition, this invention is not limited by this although the digital camera which is not equipped with advanced intelligence functions, such as the Perth amendment and OCR, was used with this operation gestalt.

[0105] For example, the digital camera equipped with the function of electronic Perth amendment in which it explained with the above-mentioned operation gestalt may be used for the system explained with this operation gestalt. Drawing 11 is the block diagram showing the system configuration in that case. In this case, Perth amendment will be performed by digital camera 101", and the image data stored in image memory 107 will be transmitted to a personal computer. With this configuration, the Perth function becomes unnecessary at the application performed with a personal computer. For this reason, there is also an advantage of becoming possible to divert the application used in order to read an image manuscript from the usual flat-bed scanner, a sheet feed scanner, etc. and to perform OCR processing.

[0106] On the other hand, although it becomes expensive as compared with the device which does not incorporate the function in order to include the function of the Perth amendment in a digital camera Since the above Perth amendments are attained by performing an electronic image processing to the image data on memory Since the conventional camera which performs Perth amendment optically is compared and the configuration of an optical lens becomes simple, if distortion amendment at the time of photography is carried out from a viewpoint of carrying out inside a digital camera, there is an advantage that the Perth amendment is cheaply realizable compared with the conventional device.

[0107] Moreover, the natural drawing photography mode in which photo scenery, a person, etc. to the digital camera which meant using loading of an alphabetic character image for a digital camera positively, and showed it to drawing 9, and the color picture data of a multiple value are obtained, and the manuscript photography mode in which binary monochrome image data is obtained in order to photo an image manuscript and to offer the data for OCR processing are formed, and it may be made to perform the mode change from a user interface 111. Furthermore, the digital camera

shown in drawing 11 can also be equipped with such a mode change function.

[0108] In addition, even if it applies this invention to the system which consists of two or more devices (for example, a host computer, an interface device, a reader, a printer, etc.), it may be applied to the equipments (for example, a copying machine, facsimile apparatus, etc.) which consist of one device.

[0109] Moreover, it cannot be overemphasized by the purpose of this invention supplying the storage which recorded the program code of the software which realizes the function of the operation gestalt mentioned above to a system or equipment, and carrying out read-out activation of the program code with which the computer (or CPU and MPU) of the system or equipment was stored in the storage that it is attained.

[0110] In this case, the function of the operation gestalt which the program code itself read from the storage mentioned above will be realized, and the storage which memorized that program code will constitute this invention.

[0111] As a storage for supplying a program code, a floppy disk, a hard disk, an optical disk, a magneto-optic disk, CD-ROM, CD-R, a magnetic tape, the memory card of a non-volatile, ROM, etc. can be used, for example.

[0112] Moreover, it cannot be overemphasized that it is contained also when the function of the operation gestalt which performed a part or all of processing that OS (operating system) which is working on a computer is actual, based on directions of the program code, and the function of the operation gestalt mentioned above by performing the program code which the computer read is not only realized, but was mentioned above by the processing is realized.

[0113] Furthermore, after the program code read from a storage is written in the memory with which the functional expansion unit connected to the functional add-in board inserted in the computer or a computer is equipped, it cannot be overemphasized that it is contained also when the function of the operation gestalt which performed a part or all of processing that CPU with which the functional add-in board and functional expansion unit are equipped based on directions of the program code is actual, and mentioned above by the processing is realized.

[0114]

[Effect of the Invention] As explained above, it is effective in the ability to perform document reading and OCR processing correctly easy again according to this invention, even if it uses a cheap digital camera with low resolution.

[0115] Furthermore, reading of a document can be easily performed using a digital camera also in environments other than a desktop environment. Moreover, for example, with conventional equipment like a flat-bed scanner, a sheet feed scanner, and a handy scanner, reading can also read the difficult document in respect of magnitude, distance, bulk, etc.

[0116]

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[Translation done.]

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**TECHNICAL FIELD**

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[Field of the Invention] Especially this invention relates to the digital camera which reads a manuscript document and performs OCR processing, the document processing system system using the digital camera, a computer-readable storage, and program code sending-out equipment about a digital camera, a document processing system system, a computer-readable storage, and program code sending-out equipment.

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**PRIOR ART**

[Description of the Prior Art] The document recorded on paper etc. is read, when it is going to change into text data and is going to hold, the document is first read as image data using OCR etc., and the image data is changed into text data. The printout of the text data is transmitted and carried out to a printer to reproduce the document. When the document is held as text data, there is a merit called improvement in reduction of data volume which memorizes the same document as compared with the case where it holds as image data, the ease of data handling, and the grace at the time of a printout.

[0003] Moreover, the flat-bed scanner, the sheet feed scanner, or the handy scanner has been conventionally used as a means for reading a document as image data.

[0004] However, since the small and cheap digital camera has recently spread, it is possible to use this as a reading means of a document. It is because this is enabled to acquire a document as image data easily except a desktop environment.

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**EFFECT OF THE INVENTION**

[Effect of the Invention] As explained above, it is effective in the ability to perform document reading and OCR processing correctly easy again according to this invention, even if it uses a cheap digital camera with low resolution. [0115] Furthermore, reading of a document can be easily performed using a digital camera also in environments other than a desktop environment. Moreover, for example, with conventional equipment like a flat-bed scanner, a sheet feed scanner, and a handy scanner, reading can also read the difficult document in respect of magnitude, distance, bulk, etc.

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**TECHNICAL PROBLEM**

[Problem(s) to be Solved by the Invention] However, when using it as a means of document reading of a digital camera, there are the following problems.

(1) When it is going to perform secured usual OCR processing of the information resolution which is required for OCR processing, it is called 200dpi with an English font, and it is said with Japanese fonts that the resolution of 300dpi extent is required. For example, if it is going to read the whole detail paper of A4 size by resolution 300dpi, it will become abbreviation 8 inch x11 inch, then about 2400x3300 pixel about the size. In a digital camera with CCD of the about 1200x1000 number of pixels which has generally spread on the other hand, data required for OCR processing are not securable.

(2) Since distortion of an incorporation image and the Perth amendment take a photograph with a need camera and the photoed image which read like other reading means (a flat-bed scanner, sheet feed scanner, etc.), and carried out the right pair correctly to the object cannot necessarily be acquired, amendment processing is needed.

[0006] This invention was made in view of the above-mentioned conventional example, and aims at offering the document processing system system using the digital camera which can do exact document read, and its digital camera, a computer-readable storage, and program code sending-out equipment.

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[Translation done.]

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**MEANS**

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the digital camera of this invention consists of the following configurations.

[0008] That is, it has the digital camera characterized by having a photography means to photo a photographic subject, and a conversion means to perform OCR processing to the image data obtained by photoing said photographic subject with said photography means, and to change said image data into text data.

[0009] Here, said photography means contains CCD including the document with which said photographic subject was recorded on the record medium.

[0010] Furthermore, it is desirable to have an output means to output text data outside.

[0011] Even when an alphabetic character image is photoed by having such a description, alphabetic character reading is made easily.

[0012] Moreover, according to other invention, it has the digital camera characterized by having a photography means to photo a photographic subject, and an amendment means to amend the image data obtained by photoing said photographic subject using said photography means.

[0013] Here, as for said amendment means, it is desirable to have a display means to display an image based on the image data for amendment like the Perth amendment, and a directions means to perform directions of the amendment.

[0014] Moreover, said photography means contains CCD including the document with which said photographic subject was recorded on the record medium.

[0015] Furthermore, it is desirable to have an output means to output text data outside.

[0016] Even when an alphabetic character image is photoed by having such a description, distortion of the read alphabetic character image is amended.

[0017] It has the digital camera characterized by having the means for switching which switches the 1st mode which acquires the image data obtained by photoing said photographic subject using a photography means to photo a photographic subject, and said photography means according to invention of further others as binary monochrome data, and the 2nd mode which acquires said image data as multiple-value color data.

[0018] Here, said photography means contains CCD including the document with which said photographic subject was recorded on the record medium.

[0019] Furthermore, it is desirable to have an output means to output text data outside. It is desirable to have the amendment means which carries out amendment like the Perth amendment as opposed to the image data obtained by photoing said photographic subject using said photography means further again, to perform OCR processing to the amended image data, and to have a conversion means to change said image data into text data further again.

[0020] By having such a description, an alphabetic character image can be inputted in the optimal format for the following processing, and memory space required for storing of an input-statement stroke image can be reduced.

[0021] An amendment means to amend the image data corresponding to two or more images of each obtained by dividing and photoing said photographic subject to two or more fields using a photography means to photo a photographic subject, and said photography means further again according to other invention, A conversion means to perform OCR processing to said amended image data, and to change said amended image data into text data, It has the digital camera characterized by having an integrated means to edit the text data corresponding to the image data for said every division image changed by said conversion means, and to unify to one text data.

[0022] Here, as for said photographic subject, it is desirable to include the document recorded on the record medium.

[0023] Moreover, as for said photography means, it is desirable to include CCD.

[0024] Furthermore, the 1st mode which photos a photographic subject as a binary image of monochrome, corresponding to the class of said photographic subject, A 1st directions means to direct to change photography mode like the 2nd mode

which photos a photographic subject as a multiple-value image of a color, It is good to have a 2nd directions means to direct to choose one division pattern as a photography means from two or more predetermined division patterns, and a 3rd directions means to carry out amendment directions to an amendment means. It is good to have an interface means to output the text data integrated by the integrated means to an external device further again. It is good to have a display means to display the image photoed by the photography means further again.

[0025] And it is good for MAMMASHININTARAKUTIBU to amend distortion of the image photoed in the clockwise rotation and the direction of a counterclockwise rotation centering on a core of a horizontal direction, a perpendicular direction, and its display image, said amendment means referring to the image displayed on the display means according to directions by the 3rd directions means.

[0026] On the other hand, as for said integrated means, it is desirable for it to be based on the image data for two or more images of every obtained by the conversion means, to detect the part to which two or more images of each adjoin or overlap mutually, and to combine the text data corresponding to the image data for two or more images of every based on the detection result.

[0027] Furthermore, a 1st storage means to store the image data for two or more images of every obtained by the division photography by said photography means, It is desirable to have a 2nd storage means to store the text data integrated by the text data changed by said conversion means and said integrated means. Furthermore, it is still more desirable when it has a compression means to compress before storing in the 1st storage means the image data for two or more images of every obtained by photography by said photography means, and an expanding means to read the image data which was compressed and was stored in the 1st storage means, and to elongate.

[0028] According to other invention, it is a document processing system system using the digital camera of the above-mentioned configuration, and has the document processing system system characterized by having a receiving means to receive the text data integrated by said integrated means, and the output means which carries out the printed output of the text based on the text data received by said receiving means further again.

[0029] Here, the output means is good in it being a printer.

[0030] A photographic subject is divided and photoed by having such a description, the image data for two or more images of every obtained by the photography is amended, and OCR processing is performed to the amended image data, and the amended image data is changed into text data, and it operates so that the text data corresponding to the changed image data for two or more images of every may be edited and it may unify to one text data.

[0031] Moreover, the printed output of the text data integrated is carried out.

[0032] An input means to input two or more images according to other invention further again, and a character recognition means to perform character recognition processing to said two or more images of each inputted by said input means, It has the document processing system system characterized by having an integrated means to unify the text data obtained by performing character recognition processing to said two or more images of each by said character recognition means in one document, and an output means to output the document obtained by said integrated means.

[0033] The program code which performs input process which is the computer-readable storage which memorized the program code which performs an image processing, and inputs two or more images further again according to other invention, The program code which performs character recognition processing to said two or more images of each inputted by said input process, The program code which performs integrated processing which unifies the text data obtained by performing character recognition processing to said two or more images of each in one document, It has the computer-readable storage characterized by having the program code which performs output processing which outputs the document obtained by said integrated processing.

[0034] The program code which performs input process which inputs two or more images further again according to other invention, The program code which performs character recognition processing to said two or more images of each inputted by said input process, The program code which performs integrated processing which unifies the text data obtained by performing character recognition processing to said two or more images of each in one document, It has program code sending-out equipment characterized by sending out a series of program codes which have the program code which performs output processing which outputs the document obtained by said integrated processing through a communication line.

[0035] Since a program equipped with the description explained above by using such equipment can be electronically offered through means of communications, such as the Internet, the value brought about also by this invention can be enjoyed quickly easy again.

[0036]

[Embodiment of the Invention] With reference to an accompanying drawing, the gestalt of suitable operation of this invention is explained to a detail below.

[0037] Drawing 1 is the block diagram showing the configuration of the document scan system (henceforth a system) which consists of a digital camera which is the typical operation gestalt of this invention, and a printer. In drawing 1, a system consists of a digital camera 101 and a printer 102, links the output of a digital camera 101 with a printer 102 directly, and can print it now.

[0038] First, the configuration of a digital camera 101 is explained.

[0039] A document is photoed by CCD103 and CCD103 outputs the analog signal acquired from the photoed document image to A/D converter 104. The photography picture signal digitized by A/D converter 104 is made binary in the binary-ized processing section 105, and a compression zone 106 compresses it further, and it is stored in image memory 107.

[0040] After being restored in the expanding section 108 and carrying out Perth amendment in the Perth amendment section 109, the binary-ized image data once stored in image memory 107 is again compressed by the compression zone 106, and is again stored in image memory 107. The Perth amendment section 109 performs Perth amendment according to directions of the amendment directions section 110 holding the contents of amendment which the user directed through the user interface 111. Here, a user interface contains the switch which a user operates, and the viewer which displays a photography image. In addition, the processing detail of the Perth amendment is explained to a detail later.

[0041] Perth amendment is carried out, and it is again elongated in the expanding section 108, and store \*\*\*\* image data is changed into text data in the OCR processing section 112, and is stored in the text memory 113 by image memory 107. The text synthesis section 114 performs synthetic processing of the contents of the text memory 113. This is processing which connects the text by which division photography was carried out in two or more images, compounds the whole document (page), and is again stored in the text memory 113.

[0042] When carrying out the printed output of the text data stored in text memory, the compounded text data is incorporated by the printer driver 115 into printer control data flow, and is outputted to a printer 102 from the interface (I/F) 116 by the side of a digital camera.

[0043] In addition, CPU117 supervises activation of each part of a digital camera, and it carries out it to control so that the above-mentioned processing may be performed. Moreover, when a digital camera performs not photography of a document but the usual photography, such as scenery and a person's photography, it is written in the image memory 107 compressed as it was, or neither binary-ized processing about the image data nor OCR processing is performed, but the image data by which A/D conversion was carried out is read from image memory 107, and the elongated image data is outputted to an interface (I/F) 116 as it is. The change of these processings is directed by the change of the switch formed in the user interface 111, and CPU117 performs it.

[0044] On the other hand, an interface (I/F) 118 receives the text data transmitted from the digital camera 101, and the text data which received consists of printers 102 with a layout predetermined in the layout section 119. And a rasterizer 120 is developed to bit map data according to the font information (Font) 121 in which the receiving text data was stored by ROM121 (un-illustrating). The data-conversion section 122 changes the bit map data into the data format and data stream according to the specification of printer engine 123, and outputs it to printer engine 123. Based on this data stream, the printed output of the printer engine 123 is carried out to the last.

[0045] In addition, CPU124 supervises activation of each part of a printer, and it controls it so that the above-mentioned processing is performed.

[0046] Next, processing until the user of a digital camera photos the document put up for paper or a wall and does the printout of this from a printer using the system of the above configurations, and actuation of a digital camera and each part of a printer are explained to a detail.

[0047] Drawing 2 is a flow chart which shows document reading and OCR processing with a digital camera.

[0048] First, in step S201, the user of a digital camera 101 operates the switch of the user interface 111 of a camera, and sets the mode of a camera as document scan mode. In this mode, a camera sets photography mode for example, as monochrome mode, and it sets it up so that the output from A/D converter 104 may be made binary. In addition, in photoing scenery, a person, etc., the user of a digital camera 101 operates the switch of the user interface 111 of a camera, and sets the mode of a camera as natural drawing mode. In this mode, a camera carries out color photography of the photographic subject, and the data of each color component (RGB) of pixel each, obtained as a result, are expressed by 8 bits.

[0049] Next, in step S202, a digital camera 101 displays the division pattern of the whole document for the page 1 of a record form on viewers, such as LCD prepared in the user interface 111, and a user chooses a desired division pattern from the switch formed in the user interface 111.

[0050] Drawing 3 is drawing showing the example of the division pattern displayed by the viewer. In these drawings, the case where drawing 3 (a) quadrisects 1 page of the whole, and drawing 3 (b) quadrisects 1 page of the whole

comparatively for 8 minutes is expressed. As shown in drawing 3, these division calls a tile each block which divided from dividing 1 page of the whole in the shape of a tile. Moreover, the number given to each tile shows the order of photography. The digital camera 101 prepares some kinds of such patterns beforehand, and a tile division pattern is determined by actuation of a user interface 111.

[0051] Furthermore in step S203, the user of a digital camera 101 photos processing in the order as which only the selected division number of sheets was displayed. At this time, for the text synthesis processing mentioned later, a photograph is taken so that the contents of each tile may overlap. Moreover, the number displayed on the division pattern shown in drawing 3 is displayed on the interior of PYUWA, and you may enable it to check which tile the user is photoing.

[0052] Next, if a digital camera 101 checks completion of photography of each tile, processing will start the Perth amendment actuation in step S204. The check of this completion displays a check prompt on a viewer for example, after division number-of-sheets photography, and when a user inputs directions of "O.K." from a switch, it is performed. The Perth amendment displays each photography image on a viewer, and a user performs it by directing amendment.

[0053] Drawing 4 is drawing showing the example of the contents of directions in the Perth amendment. In these drawings, in drawing 4 (a), the whole inclination amendment (rotation) and drawing 4 (b) show horizontal keystone correction, and drawing 4 (c) shows vertical keystone correction.

[0054] A digital camera 101 displays in piles a square amendment gage like the dotted line shown at drawing 4 on the image on a viewer screen. As shown in drawing 4 (a), four top-most vertices of the amendment gage are set to "A", "B", "C", and "D." A user rotates the amendment gage by button grabbing prepared in the user interface 11, or makes it deform. Directions of spin compensation rotate the gage to a clockwise rotation or a counterclockwise rotation by setting a revolving shaft as the core of an amendment gage, as shown in drawing 4 (a). Moreover, if the amendment gage of \*\*\*\*\* deforms into a trapezoid with parallel surface and lower side from the first as it is shown in drawing 4 (b), when horizontal amendment is directed, and perpendicular direction amendment is directed, as shown in drawing 4 (c), the amendment gage of \*\*\*\*\* will deform left part and the right-hand side into an parallel trapezoid from the first. Thus, deformation of rotation, a horizontal direction, a perpendicular direction, and an amendment gage is directed, and finally, if a user inputs directions of "O.K." from a switch, a digital camera will amend Perth of the whole image so that the displayed amendment gage may serve as a rectangle.

[0055] This Perth amendment elongates once the data of the photography image held at image memory 107 in the expanding section 108, and the Perth amendment section 109 with work-piece memory is performed according to the contents of directions from the amendment directions section 110. Then, the image data which amended is repressed by the compression zone 106, and is again stored in image memory 107. Such a series of procedures are controlled by CPU117, and the Perth amendment processing to all photography images is performed.

[0056] Here, the detail of the Perth amendment is explained with reference to drawing 5 - drawing 6.

[0057] Drawing 5 is the block diagram showing the internal configuration of the Perth amendment section 109. The coordinate-transformation section which performs coordinate transformation to the buffer which 109a inputs the data elongated in the expanding section 108 in drawing 5, and is held temporarily, and the data with which 109b was held at buffer 109a, the interpolation processing section to which 109c performs interpolation processing further about the data with which coordinate transformation was performed, and 109 d are the buffers which store temporarily the data with which coordinate transformation and interpolation processing were performed.

[0058] And the data stored in buffer 109d are fed back to a compression zone 106.

[0059] Drawing 6 is a flow chart which shows the processing detail of the Perth amendment. If it is called the Perth amendment according to the configuration shown in drawing 5, it will be generating the pixel data stream which loads the image data elongated in the expanding section 108 to buffer 109a, performs coordinate transformation and interpolation processing to the pixel data which constitute each tile according to the rotation directions by the user, or the deformation directions to level/perpendicular direction in this, and constitutes the tile after rotation or deformation to buffer 109d.

[0060] Hereafter, the processing detail is explained. Here, it is premised on image data already being loaded to buffer 109a. Moreover, the location of the pixel of the arbitration which constitutes the image data before Perth amendment is performed is expressed with (X, Y), and the location which is the pixel after Perth amendment was performed presupposes that it is expressed with (x, y).

[0061] First, at step S211, each coordinate value of the image data (for example, side A'D' and side B'C' of drawing 4 A) after rotation or/, and deformation were made according to rotation directions or/, and deformation directions is calculated in the tile with which directions of the Perth amendment were made about each coordinate value of the image data for two rasters including the top-most vertices of a tile which counter (for example, the side AD and the side (BC)

of drawing 4 A).

[0062] Next, at step S212, the obtained coordinate value is compared with the coordinate value before coordinate transformation, and the shift amount per each pixel of a tile is calculated.

[0063] For example, in the case of drawing 4 A - drawing 4 C, the pixel of "Y0" individual is perpendicularly between the side AD and the side BC about input image data, and if the side AD and the side BC have the pixel of "X0" individual horizontally, respectively, they are as follows, respectively. [ of the horizontal and the shift amount (Xshift, Yshift) about a perpendicular direction of each pixel which constitute a tile ]

The coordinate value after coordinate transformation is calculated by carrying out sequential accumulation of this shift amount perpendicularly with each pixel as the starting point which constitutes the side AD about each pixel in a tile at step S213 in  $Xshift=(x-X)/X0$   $Yshift=(y-Y)/Y0$  pan based on the obtained shift amount.

[0064] For example, the i-th is as follows, and when were based on this shift amount and the A point of the tile before conversion is made into a zero, the j-th coordinate value ( $x_i, y_j$ ) is as follows perpendicularly horizontally.

$$xi = i + Xshift - (i-1)$$

$$yj = j + Yshift - (j-1)$$

At step S214, the image data by which coordinate transformation was carried out by doing in this way is stored in buffer 109d. Processing of steps S211-S214 explained above is performed in coordinate transformation section 109b.

[0065] Next, it investigates whether in step S215, processing is vacant in the tile after rotation and/or deformation, and has a pixel.

[0066] For example, if an image is extended horizontally in drawing 4 B, many pixels will be contained in the tile after deformation from the tile before deformation, and many empty pixels to which image data does not correspond to the tile after deformation only by performing coordinate transformation will arise.

[0067] Since in drawing 4 B the side AD was not extended but the side BC is extended, as for "X0" \*\*\*\*\*, then its dilation ratio (alpha), a pixel is set to  $\alpha=X0' / X0$  at side B'C'.

[0068] Therefore, the pixel of an individual ( $X0'-X0$ ) is in an opening on side B'C', and it is in the raster line of the j-th line from the side AD ( $X0/Y0$ ). -(alpha-1)- An empty pixel without data generates j pixels.

[0069] in addition, the result obtained in coordinate count of a pixel in the above explanation -- an integer -- it cannot be overemphasized that are-izing and it is used.

[0070] When it is judged that there is an empty pixel in step S215 from the above reason, processing progresses to step S216, makes the empty pixel an attention pixel, and interpolates and calculates the value of the attention pixel using the pixel in which surrounding data exist. The interpolated data is written in buffer 109d. Then, processing progresses to step S217.

[0071] On the other hand, when it is judged that there is no empty pixel, it investigates whether processing progressed to step S217 and the processing about the pixel for 1 raster line ended it. Here, if it is judged that the processing about the pixel for 1 raster line is not completed, processing will return to step S213, but if it is judged that the processing was completed, processing will progress to step S218.

[0072] At step S218, it investigates whether the processing about the image data for one tile was completed. Here, if it is judged that the processing about all the pixels for one tile is not completed, processing will return to step S213, but processing will be ended if it is judged that the processing was completed.

[0073] Such Perth processing is performed about each tile.

[0074] Then, processing changes the contents of photography of each tile into text data in the OCR processing section 112 in step S205. Furthermore, the OCR processing section 112 processes into the data of the two-dimensional array structure corresponding to the line of a text the text data obtained from each tile, and stores this in the text memory 113.

[0075] At step S206, the text synthesis section 114 compounds the text data for every tile, and generates the whole document data. As this is the following, it is performed.

[0076] That is, since the contents of each tile overlap and are read at the time of photography of a document as mentioned above, by comparing the periphery of the text data of each tile of two-dimensional array structure, the same character is found out, and a duplicate character deletes one of these, and it connects and unites the text data of each tile so that a continuous text may be done.

[0077] For example, when a text connects the tile 1 and tile 2 of drawing 3 B by lateral writing, the same data stream (lengthwise direction) as the left end section of the text data of a tile 2 searchs whether it exists in the text data of a tile 1, and detects the part which overlaps. And the part which overlaps is deleted from a tile 1 or a tile 2, and after that, the text data of two tiles is compounded and it unifies to new DS. This is similarly performed about tiles 3 and 4.

[0078] Next, the tile with which tiles 1 and 2 were combined, and the tile with which 3 and 4 were combined are joined in the direction of a line (width). This detects the line of both same contents and unifies it to still newer DS the same with

being related with a lengthwise direction. Even when overlap between tiles is not detected by these processings, these tiles have touched spatially, or since it can be regarded as close data, they unify DS, assuming that it has touched here. Or since that is specified when overlap is not detected, tooth-space insertion may be carried out and a tile may be combined.

[0079] Thus, the document for 1 page finally read is unified to one DS, and the DS integrated is re-stored in the text memory 113.

[0080] Next, a printed output is explained with reference to the flow chart shown in drawing 5.

[0081] First, a user takes out print directions with step S301 through a user interface 111. Next, a printer driver 115 publishes a command required for print directions, and controls a printer by step S302 while it transmits the text data which was stored in the text memory 113 and which is integrated to a printer 102 through an interface (I/F) 116. In addition, in print directions, while specifying the interface of a digital camera and a printer so that a print layout may be possible, a digital camera 101 may be equipped with the function which can perform layout directions from a user interface 111. On the other hand, a printer 102 receives text data through an interface (I/F) 118, and performs layout processing according to a form setup etc. in the layout section 119.

[0082] Furthermore, at step S303, a rasterizer 120 rasterizes the text data arranged using the predetermined font stored in ROM121, and the data-conversion section 122 changes the data rasterized and bit-map-ized into the data stream which suits printer engine 123 in step S304 in order of conversion, i.e., the format for which printer engine 123 needs, and data delivery.

[0083] Finally, at step S305, according to the print timing of printer engine 123, the changed data stream is transmitted to printer engine 123, and a printed output is carried out to real time.

[0084] Therefore, if the operation gestalt explained above is followed, the document recorded on the page 1 of a record form will be divided and read. Since the image data which carried out division read is changed into text data, it unifies to the text data which edits, connects and unites the changed text data, and is equivalent to the page 1 of a record form and the printed output of the unified text data is carried out. Even if the read resolution of a digital camera is low and resolution sufficient in reading which is 1 time to perform OCR processing is not obtained. By dividing and reading a document, resolution required for OCR processing is secured, after that, edit integration of the text data obtained by OCR processing can be carried out automatically, and the text data for 1 page can be created.

[0085] This can perform read of a document, and OCR processing easily using a digital camera also except a desktop environment.

[0086] Furthermore, since it has data storage memory in the digital camera itself, there is also an advantage that the immediate printing output also of the \*\* can be carried out without a host etc.

[0087] In addition, the example explained above explained as an example the Perth amendment, OCR, and the digital camera that contained the function of text synthesis. However, this invention is not limited by this.

[0088] For example, if it is the digital camera equipped with CCD of high resolution, tile division etc. does not have the need and, so, the function of text synthesis is unnecessary. Moreover, if the graphic size drawn on the image manuscript is large enough, even if it is the digital camera equipped with CCD of a low resolution, tile division etc. does not have the need, and, so, the function of text synthesis is unnecessary. Furthermore, since it becomes without distorting the image to picturize when a digital camera can be fixed to a tripod or a stand and it can be made to meet correctly to an image manuscript, the function of the Perth amendment becomes unnecessary.

[0089] Therefore, like digital camera 101a shown in drawing 8 as a minimum configuration of the digital camera in this operation gestalt, if it is the configuration equipped with the OCR processing section 112, document read and OCR processing can be performed. Since the configuration of the digital camera is simplified by this and some memory and circuits can be omitted by it, there is an advantage of becoming cheap.

[0090]

[Other operation gestalten] now -- although the above-mentioned operation gestalt explained the example which constituted the system from a digital camera and a printer, since an advanced intelligence function is required of a digital camera with this configuration -- a digital camera and the printer itself -- it will become expensive. Therefore, the example which is made to perform the Perth amendment and OCR processing with a personal computer, and constitutes a document scan system from this operation gestalt by the digital camera which can only read two or more images, the personal computer, and the printer is explained.

[0091] Drawing 8 is the block diagram showing the outline configuration of the document scan system according to this operation gestalt. in addition, in drawing 8, drawing 1 already explained -- the same reference number is given to the same component, and the explanation is omitted.

[0092] The document scan system shown in drawing 8 consists of digital camera 101', a personal computer 130, and a

printer 102. The configuration of digital camera 101' is simplified compared with it which showed drawing 1, it is picturized by CCD103 and the image data by which compression storing was carried out is transmitted to a personal computer 140 through host interface 116' at image memory 107 so that the comparison with drawing 8 and drawing 1 may show.

[0093] Now, the personal computer 130 While controlling the whole equipment, various application programs (it is called application) are performed. When CPU131 performs CPU131 which performs various processings, ROM132 which stores a control program and various constants, a control program, and application It equips with RAM133 which is alike and is used as a working area, and CD-ROM142 which stored various programs and data. The hard disk drive (HDD) 136 and image which are used since CD-ROM drive 134 to read, the floppy disk drive (FDD) 135 which output and input information between floppy disks 143, and mass data are stored, a text, a graphic form -- etc. -- displaying -- CRT -- or -- LCD -- etc. -- a display (DPY) -- 137 -- a mouse -- a key -- containing -- a keyboard -- (-- KB --) -- 138 -- etc. -- an element -- from -- being realized -- \*\*\*\*.

[0094] And such a component of each other is connected by the CPU bus 144.

[0095] further -- these elements -- in addition, it has various kinds of interfaces for connection with a network, or connection with a peripheral device. That is, it has the printer interface 141 used in order to transmit data to the digital camera interface 140 used in order to receive the network interface 139 and the image data from digital camera 101' which are used in order to download a program from remote-data sending-out equipment 150 by the Internet, LAN, etc. or to transmit and receive various data through a communication line, and a program 102 and to make a printed output perform.

[0096] Now, if the application which performs the Perth amendment which was explained with the above-mentioned operation gestalt by reading the download which minded [ of the above configurations / 130 ] the network from remote-data sending-out equipment 150, CD-ROM142 or a floppy disk 143, etc., and OCR processing is installed, the Perth amendment and OCR processing can be performed in a personal computer 130.

[0097] Next, with reference to the flow chart shown in drawing 9, the Perth amendment and OCR processing which are performed in a personal computer 130 are explained. Here, install of application is already completed, digital camera 101' is connected to a personal computer 130, and two or more tiles which divided and picturized the 1-page image manuscript to two or more fields are transmitted and elongated by the personal computer 130 from digital camera 101', and suppose that it is stored in a predetermined storage (for example, hard disk 136).

[0098] Starting of the application which performs the Perth amendment and OCR processing by operating a keyboard and a mouse chooses first the image manuscript for 1 page used as the Perth amendment and the object which performs OCR processing (tile set) at step S401. This selection is performed to MAMMASHININTARAKUTIBU, while an operator looks at a display screen. At step S402, a tile set is loaded to the working area of RAM133 by this selection.

[0099] Next, at step S403, the tile which serves as a processing object from the loaded tile set is chosen as MAMMASHININTARAKUTIBU. Then, it is asked whether application performs the Perth amendment processing to an operator in step S404. Here, if that is answered when an operator judges that the amendment is performed, it will be further asked to an operator what kind of Perth amendment processing progresses to step S405 and carries out. Here, the directions which an operator performs are the same Perth amendment assignment as the above-mentioned operation gestalt explained. After the assignment is completed, processing performs processing of the same Perth amendment in step S406 as the above-mentioned operation gestalt explained. Amendment will be performed to the image data of the tile loaded to the working area of RAM133 by this.

[0100] Now, when it is judged that the Perth amendment processing is not performed, after completing processing to step S406, processing progresses to step S407 and performs OCR processing. Text data is generated from a tile by this. This text data is stored in a predetermined storage (for example, hard disk 136) in step S408.

[0101] Then, it judges whether processing processes the following tile in step S409. Here, if the processing about all the tiles that constitute the 1-page image manuscript used as a processing object has not been completed, processing will repeat return and the above-mentioned processing to step S403. On the other hand, if the processing about all tiles is completed, it will progress to step S410.

[0102] Edit generation of the text data which compounds the text data generated for every tile, and constitutes a 1-page image manuscript from a step S410 is carried out. Since processing of this edit and generation is the same processing as the above-mentioned operation gestalt explained, that explanation is omitted.

[0103] Therefore, if the operation gestalt explained above is followed, even when it does not have an advanced in RIJIENSU function in a digital camera, it will become possible by using the function of a personal computer to generate text data. Moreover, since the application performed in the personal computer can be downloaded and installed through a network from the equipment which it installed using storages, such as CD-ROM and a floppy disk, and also was formed

in the remote place, it also has the advantage that the application can be offered more quickly.

[0104] In addition, this invention is not limited by this although the digital camera which is not equipped with advanced intelligence functions, such as the Perth amendment and OCR, was used with this operation gestalt.

[0105] For example, the digital camera equipped with the function of electronic Perth amendment in which it explained with the above-mentioned operation gestalt may be used for the system explained with this operation gestalt. Drawing 11 is the block diagram showing the system configuration in that case. In this case, Perth amendment will be performed by digital camera 101", and the image data stored in image memory 107 will be transmitted to a personal computer. With this configuration, the Perth function becomes unnecessary at the application performed with a personal computer. For this reason, there is also an advantage of becoming possible to divert the application used in order to read an image manuscript from the usual flat-bed scanner, a sheet feed scanner, etc. and to perform OCR processing.

[0106] On the other hand, although it becomes expensive as compared with the device which does not incorporate the function in order to include the function of the Perth amendment in a digital camera Since the above Perth amendments are attained by performing an electronic image processing to the image data on memory Since the conventional camera which performs Perth amendment optically is compared and the configuration of an optical lens becomes simple, if distortion amendment at the time of photography is carried out from a viewpoint of carrying out inside a digital camera, there is an advantage that the Perth amendment is cheaply realizable compared with the conventional device.

[0107] Moreover, the natural drawing photography mode in which photo scenery, a person, etc. to the digital camera which meant using loading of an alphabetic character image for a digital camera positively, and showed it to drawing 9, and the color picture data of a multiple value are obtained, and the manuscript photography mode in which binary monochrome image data is obtained in order to photo an image manuscript and to offer the data for OCR processing are formed, and it may be made to perform the mode change from a user interface 111. Furthermore, the digital camera shown in drawing 11 can also be equipped with such a mode change function.

[0108] In addition, even if it applies this invention to the system which consists of two or more devices (for example, a host computer, an interface device, a reader, a printer, etc.), it may be applied to the equipments (for example, a copying machine, facsimile apparatus, etc.) which consist of one device.

[0109] Moreover, it cannot be overemphasized by the purpose of this invention supplying the storage which recorded the program code of the software which realizes the function of the operation gestalt mentioned above to a system or equipment, and carrying out read-out activation of the program code with which the computer (or CPU and MPU) of the system or equipment was stored in the storage that it is attained.

[0110] In this case, the function of the operation gestalt which the program code itself read from the storage mentioned above will be realized, and the storage which memorized that program code will constitute this invention.

[0111] As a storage for supplying a program code, a floppy disk, a hard disk, an optical disk, a magneto-optic disk, CD-ROM, CD-R, a magnetic tape, the memory card of a non-volatile, ROM, etc. can be used, for example.

[0112] Moreover, it cannot be overemphasized that it is contained also when the function of the operation gestalt which performed a part or all of processing that OS (operating system) which is working on a computer is actual, based on directions of the program code, and the function of the operation gestalt mentioned above by performing the program code which the computer read is not only realized, but was mentioned above by the processing is realized.

[0113] Furthermore, after the program code read from a storage is written in the memory with which the functional expansion unit connected to the functional add-in board inserted in the computer or a computer is equipped, it cannot be overemphasized that it is contained also when the function of the operation gestalt which performed a part or all of processing that CPU with which the functional add-in board and functional expansion unit are equipped based on directions of the program code is actual, and mentioned above by the processing is realized.

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[Translation done.]

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the document scan structure of a system which consists of a digital camera which is the typical operation gestalt of this invention, and a printer.

[Drawing 2] It is the flow chart which shows document reading and OCR processing with a digital camera.

[Drawing 3] It is drawing showing the example of the division pattern displayed by the viewer.

[Drawing 4] It is drawing showing the example of the contents of directions in the Perth amendment.

[Drawing 5] It is the block diagram showing the configuration of the Perth amendment section.

[Drawing 6] It is the flow chart which shows the detail of the Perth amendment processing.

[Drawing 7] It is the flow chart which shows a printed output.

[Drawing 8] It is the block diagram showing the configuration which used the digital camera of a short form to the system shown in drawing 1.

[Drawing 9] It is the flow chart which shows the document scan structure of a system which consists of a digital camera, a personal computer, and a printer.

[Drawing 10] It is the flow chart which shows the image processing in a personal computer.

[Drawing 11] It is the block diagram showing the configuration of the modification of the system shown in drawing 9.

### [Description of Notations]

101 Digital Camera

102 Printer

103 CCD

104 A/D Converter

105 Binary-sized Processing Section

106 Compression Zone

107 Image Memory

108 Expanding Section

109 Perth Amendment Section

110 Amendment Directions Section

111 User Interface

112 OCR Processing Section

113 Text Memory

114 Text Synthesis Section

115 Printer Driver

116 Interface (I/F)

117 CPU

118 Interface (I/F)

119 Layout Section

120 Rasterizing Section

121 ROM

122 Data-Conversion Section

123 Printer Engine

124 CPU

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[Translation done.]

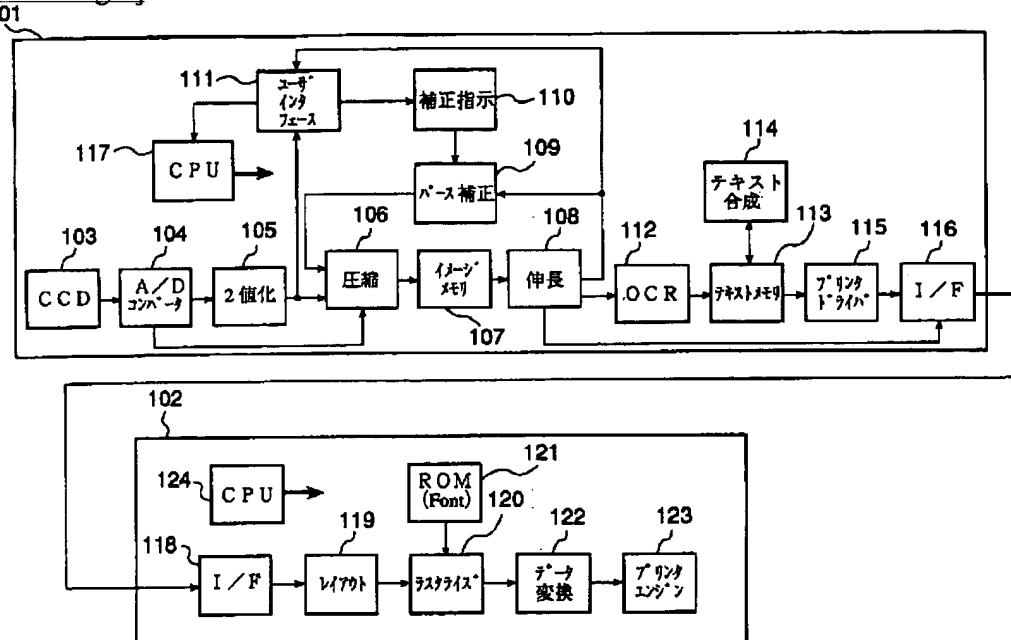
## \* NOTICES \*

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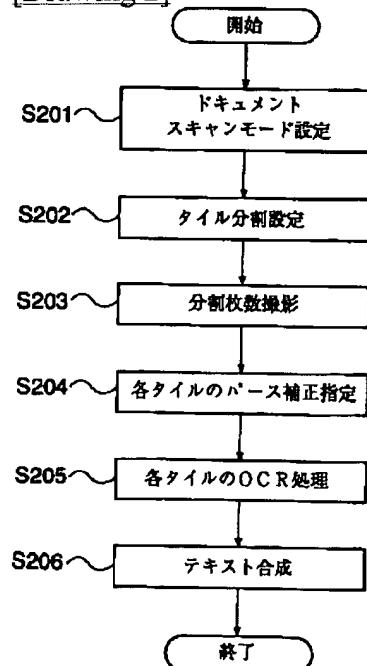
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## DRAWINGS

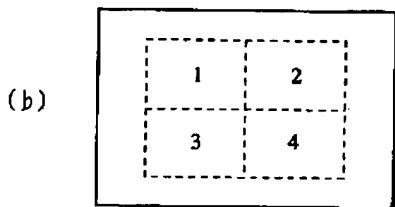
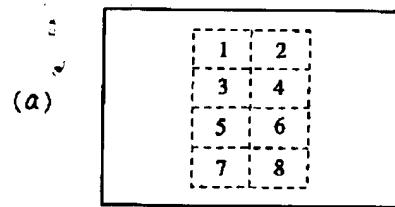
## [Drawing 1]



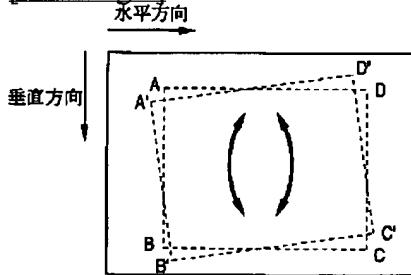
## [Drawing 2]



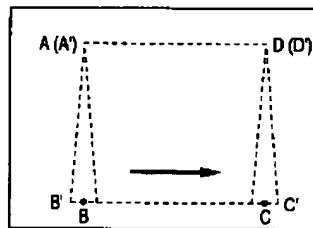
## [Drawing 3]



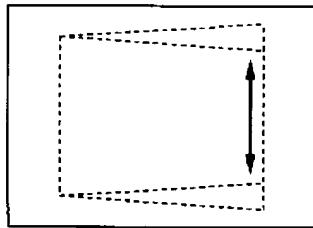
[Drawing 4]



(a)

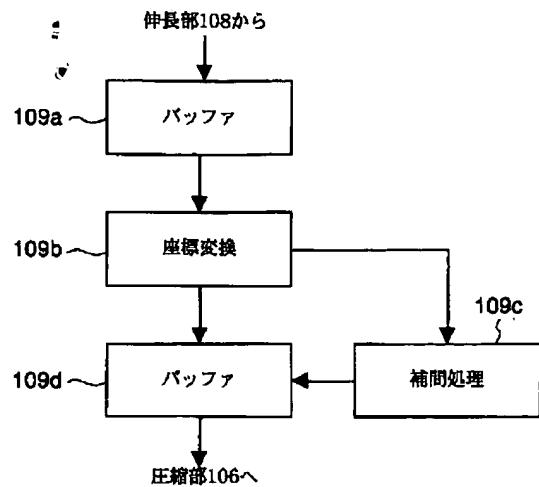


(b)

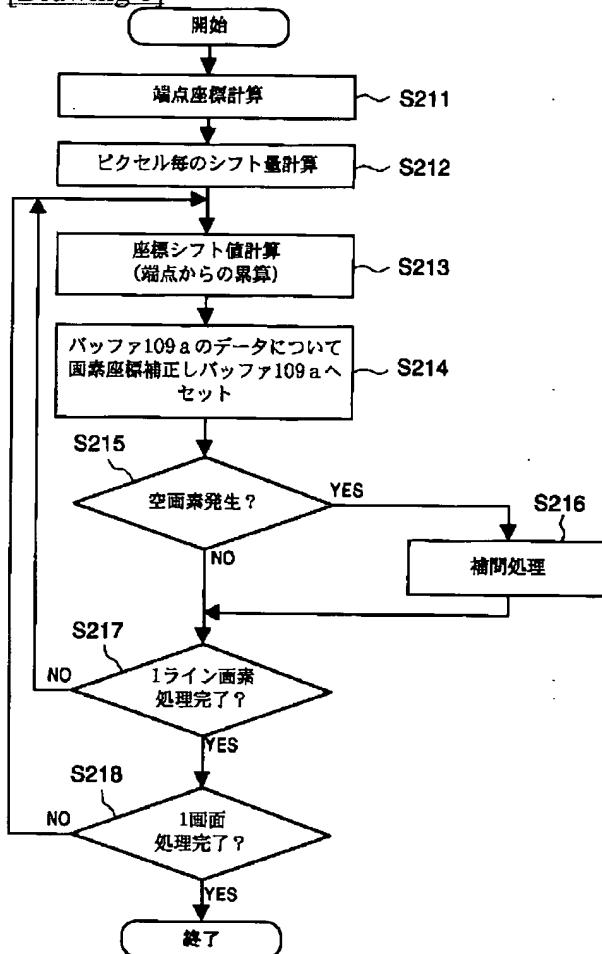


(c)

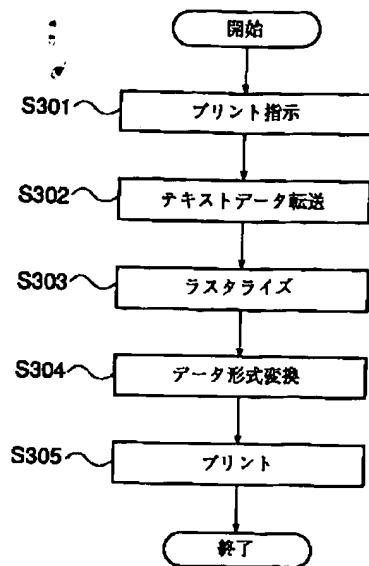
[Drawing 5]



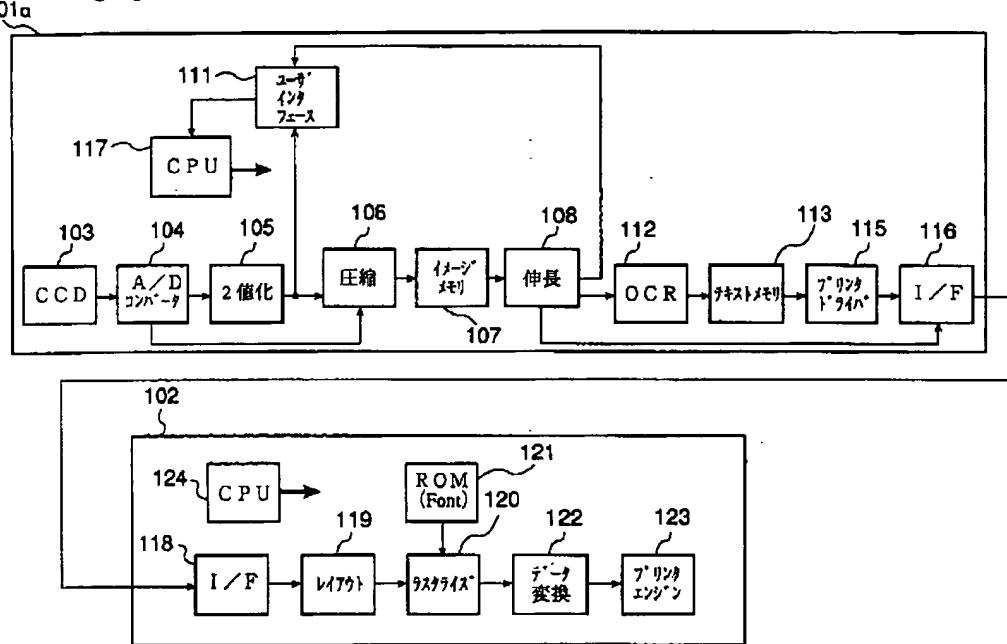
[Drawing 6]



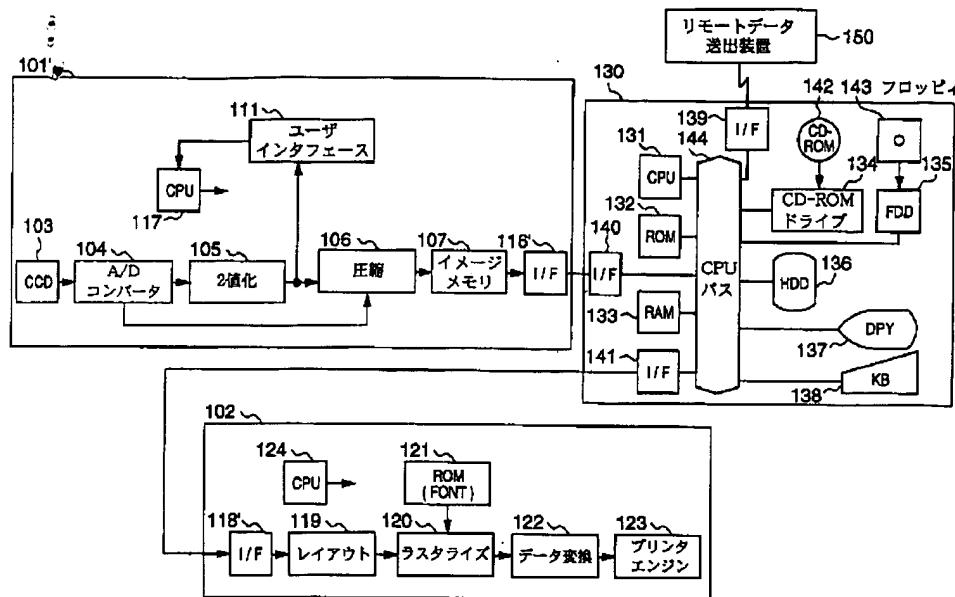
[Drawing 7]



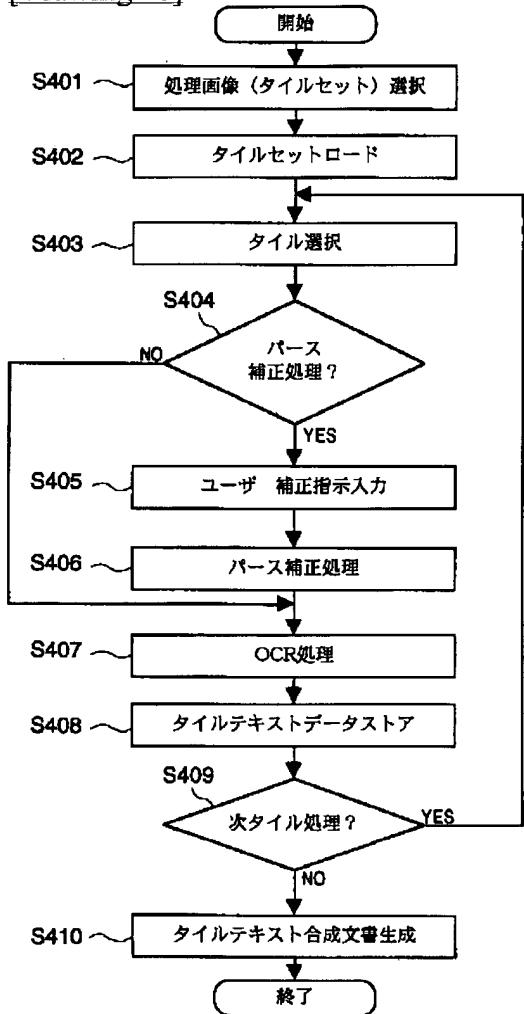
[Drawing 8]



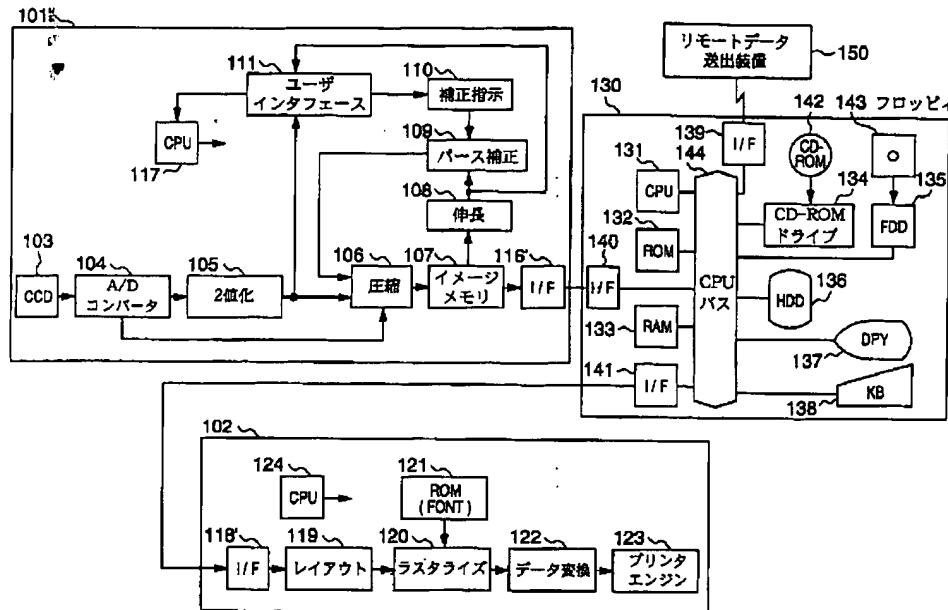
[Drawing 9]



[Drawing 10]



[Drawing 11]



[Translation done.]